

University ‘Mapping’ Education in Australia – a Confusing Exposure?

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Abstract Australia has documented problem of insufficient entrants to the mapping – spatial – surveying industry and this is reflected in a shortfall of students entering university appropriate courses. As the internet is one of the main marketing conduits for potential consumers, this paper assessed whether Australian universities were maximizing this marketing resource to entice students into ‘mapping’ type courses. The websites of all Australian universities were accessed to ascertain the ease of extracting mapping course information and also for pertinent examples of mapping technologies to showcase through an examination of campus maps. The research found that it was not a particularly easy exercise to locate ‘mapping’ courses on Australian university websites due to the wide ranging and inconsistent nomenclature. From a showcase perspective, campus maps varied in detail and functionality, but in general non-mapping teaching universities tended to have more advanced and interactive campus maps than those universities which provided mapping courses. The paper concludes with recommendation that a consistent brand is required and that mapping teaching universities should take the lead in the promotion of mapping capabilities to serve the industry need for mapping professionals.

Keywords: mapping, universities, spatial

1. Introduction

In the past, an association with maps was akin to wearing an anorak (a nerd like garment), but through the advent of new innovative technologies e.g. Geographical Information Systems (GIS), maps have ‘donned a hoodie’ and become ‘cool’, (Painter, 2006). However, hoodies can project a demonising (Johnstone and Burman, 2009), antisocial behaviour persona (Smith, Philips and King, 2010) and as such, constitute a menacing attire and this could be very apt with regards to GIS for, as Hakley (2010) noted, GIS are

difficult to use. With the emergence of more user friendly technologies e.g. Google Earth, maybe a demonising GIS 'hoodie' persona is gradually being modified or removed. Furthermore, the reduction in complexity has allowed the public to not only engage with GIS, but to go further and create their own data (Masser, 2009). Therefore, knowingly or unknowingly, more people are entering the mapping domain and possibly some of these could be intrigued to know more, even to the extent of considering a career in the industry.

In 2006/2007 the Australian mapping/ spatial information industry generated A\$1.37 billion annually and was used for a variety of biodiversity, environment and social benefits (CRCSI, 2008). However, further contributions could be hampered, especially by the shortage of mapping/ spatial information skilled people in Australia (AGTA, 2007); a situation that is exacerbated by an inadequate supply of students entering university mapping/ spatial information courses (McDougall et al, 2006). The lack of university entrants is particularly pertinent as it is the optimal path in establishing a professional accredited Australian workforce (SSSI, 2012).

There could be many reasons for low student numbers, but a useful starting point would be an analysis of marketing processes. Armstrong and Kotler (2007) noted that the first goal of marketing is to attract new customers and the Australian spatial industry could be well positioned in this regard by capitalising on the renewed interest in mapping. Potential customers tend to use the internet and search engines to locate information they need (Gandal, 2001; Awad, 2004) and as such it would seem logical that university education websites would be the first port of call for students wishing to pursue an academic path that would result in a career in the spatial information industry.

This paper will investigate whether Australian university education institutions are maximising marketing opportunities through their respective websites to expose the mapping/ spatial information profession and also enable courses to be easily found by potential new students.

2. Background

2.1. Australian mapping/ spatial information education

Australia's population of 23,000,000 (ABS, 2012a) reside in six states and two territories and are serviced by 39 universities. The proportion of young people (aged 15-24) at university has risen to approximately 20% (Muir et al, 2009) and the most popular courses being Management and Commerce followed by Society and Culture (ABS, 2012b). However, these figures have

masked the issues facing Australian science education as the number of secondary students studying sciences between 1991 and 2007 reduced which had a subsequent negative effect on tertiary science education (Cory, 2011). Similarly, mathematics student numbers have also declined and, with respect to tertiary, between 2001 to 2007 numbers reduced from 2100 to 1800, a trend that has had significant impact on industry (Thomas, Muchatuta and Wood, 2009). With the reliance on physics and maths, the mapping/ spatial information student numbers in Australia have followed a similar downward path (McDougall et al, 2006) and, when coupled with 'a significant retirement bulge' (Lyons and Davies, 2011), has resulted in an unsustainable position for the mapping/ spatial industry. Despite industry efforts such as the Victorian Surveying Task force, Surveying South Australia, and Queensland's Destination Spatial, student numbers remain dangerously low, a concern reiterated by the University of New South Wales (Spatial Source, 2011). As such, capitalising on the interest in maps generated in the public through the use of 'disruptive' technologies such as Google Earth, could be useful.

2.2. Disruptive technologies

New technologies can be classed as sustaining or disruptive, with the former relating to existing product improvements in relation to main customer bases (Christensen, 2003) and the latter to 'products with different performance attributes that may not have been valued by existing customers' (Walsh, 2004). Padget and Mulvey (2007) suggested that firms that adhered to a sustaining approach, perceived disruptive technologies as risky, and would rather pursue the existing and rewarding company base. Indeed, such reluctance to change was deemed an 'innovator's dilemma' as companies believed that due to size, they could not react quickly enough due to their inherent business processes (Christensen and Overdorf, 2000). However, disruptive technology does not have to be entirely new, but it should possess "superior 'performance trajectories' along critical dimensions that customers' value" (Bower and Christensen, 1995) and be characteristically cheaper, simpler, smaller, have higher frequency, more convenience and serve emerging markets such as young people (Christensen, 2003). Padget and Mulvey (2007) noted companies that embraced disruptive technologies out performed those that did not. To serve the increasing demand for mapping/spatial information professionals, Australian universities could follow a sustaining approach and continue along the existing path, but it could be more advantageous to review disruptive technologies to ascertain any opportunities they behold.

2.3. Marketing

Marketing can be defined as ‘an organizational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders’ (AMA, 2004). ‘If you build it, they will come’ was the historical university marketing motto, but this is no longer a desirable approach (Eccles, 2004). During the late 1990s and early 2000s, more proactive student recruitment began in Australian universities (Marginson, 2002). However, marketing university courses is complex due to the length of the transaction (e.g. 3-4 years) and relationship between a number of parties including students, parents, governments and the university itself (Moogan, 2011). Indeed, the traditional transaction of fee for good or service is not quite applicable in academia as ‘there needs to be clear understanding that tuition facilitates education but does not cause it’ (Eagle and Brennan, 2007) and the quality of the end product is determined by the level of student input as well as the quality of the facilities and staff (Durkin and McKenna, 2011). East (1997) classified consumption into 3 forms; important purchases, repetitive consumption and involuntary consumption and it can be interpreted that choosing a university qualification is in the important category as it generally leads to a career path. These types of purchases are new and novel and the decision maker (student) has little experience (within university processes) on which to base a decision. Furthermore, Simkin (2000) indicated that a consumer buying process is affected by personal, psychological and social influences during a traverse between problem recognition through to purchase evaluation (*Figure 1*).

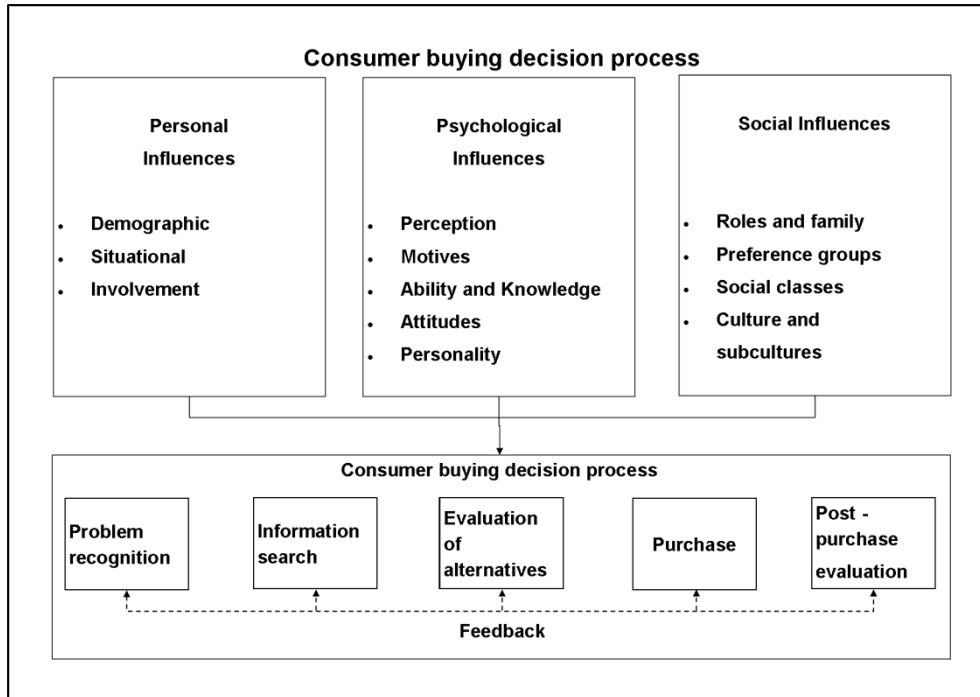


Figure 1. Consumer buying decision process (Simkin, 2000)

Using *Figure 1*, for the purposes of this paper it is assumed that a potential student has been made aware of mapping/ spatial information via disruptive technologies e.g. Google Earth, and has moved onto a more detailed search about it. Marketeers traditionally employ the 4Ps marketing mix i.e. product, price, place and promotion (Ruskin-Brown, 2006) and this paper will focus upon ‘product’ as this is possibly where issues could arise for students, as there is no definitive product or rather, using a more marketing term, ‘brand’. Terms in this ‘space’ include ‘spatial’ (Heywood, Cornelius and Carver, 2006), ‘geographic’ (Wilson and Fotheringham, 2008), GIS (Tomlinson, 2007), ‘cartography’ (Harley, 2001), ‘surveying’ (McCormac, 1999), ‘geospatial’ (PSU, 2012), ‘geomatics’ (Gomarasca, 2009). The lack of a discernible brand is problematical as a brand is a source of differentiation and a strategic opportunity to ‘create a strong and distinctive image’ (Kohli, 1997). A strong, well established brand is an important factor as ‘it tells customers many things, not only by the way it sounds (and its literal meaning if it has one) but more importantly, via the body of associations it has built up and acquired as a public object over time’ (Gardner and Levy, 1955). Wilson and Gilligan (2002) endorsed the importance of branding as a factor in the creation of an understandable university image and value that to which consumers can relate.

From the literature reviewed, it would seem that Australian universities offering mapping/ spatial information courses should have a brand that prospective new students would understand and relate to, whilst

concurrently ensuring that the brand is consistent across the country and through time. By undertaking such a positioning of the brand, consumers (students) would be able to distinguish between other brands, help them understand the brand and what they will achieve when the brand is selected (Tybout and Sternthal, 2005).

3. Method

A twofold approach was adopted that initially reviewed the understanding of the mapping/ spatial information brand and then subsequently involved an exploration to ascertain if there was brand consistency throughout Australia.

3.1. Brand understanding – campus maps

Branding was investigated with an assessment of a facility that many potential students could access and use i.e. university campus maps. Other countries have developed exemplar products, such as the Norwegian University of Science and Technology (NTNU) CampusGuiden interactive campus map. This NTNU campus map can be used on a smartphone, tablet or computer to facilitate navigation around campus and guide users to the correct building, floor and room to an accuracy of 5-10 metres based upon a combination of Wi-Fi network (indoors) and GPS (outdoors) (NTNU, 2012). Therefore, to ascertain if Australian universities that taught mapping/ spatial information showcased the industry through such cutting edge campus maps, their respective websites were investigated to determine the level of functionality. Campus maps were assessed to identify if they were readily available on homepages, were static representations e.g. the University of South Australia (UniSA), used third party sources e.g. Google Maps at the University of New South Wales (UNSW), or had interaction that allowed data exploration (Slocum et al, 2005) e.g. Curtin University (*Figure 2*).

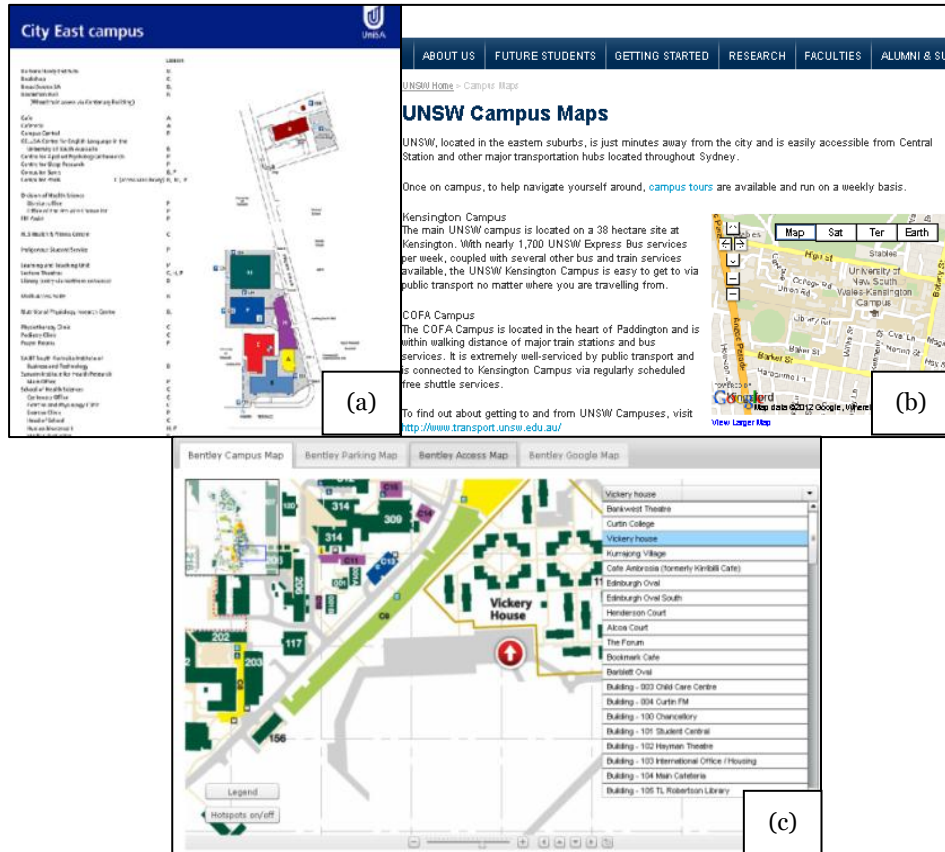


Figure 2. Campus maps at:

- (a) UniSA-static (UniSA, 2012)
- (b) UNSW- third party (UNSW, 2012)
- (c) Curtin University – data exploration (Curtin University, 2012)

3.2. Brand consistency – degree courses

To address brand consistency, all Australian university websites and the respective State and Territories university admissions centre websites were investigated to identify the relevant university degree courses that students could undertake. Searches were performed using terminology

encompassing ‘geographic’, ‘geomatic’, ‘GIS’, ‘map’, ‘spatial’, ‘surveying’ ‘cartograph’ and ‘geospatial’.

4. Results

4.1. Brand understanding – campus maps

From the 39 Australian university websites visited, mapping/ spatial information teaching universities were in the minority (*Figure 3*), but did have a higher percentage of campus maps links on their university homepage (*Figure 4*). Most universities had static campus maps (*Figure 5*) and both types of universities had similarities with regards to third party maps (*Figure 6*). However, non-teaching universities dominated data exploration maps (*Figure 7*).

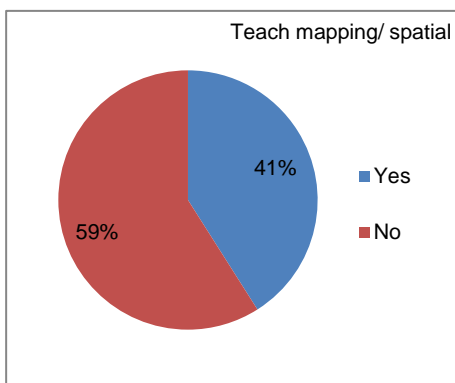


Figure 3. Teach mapping/ spatial information

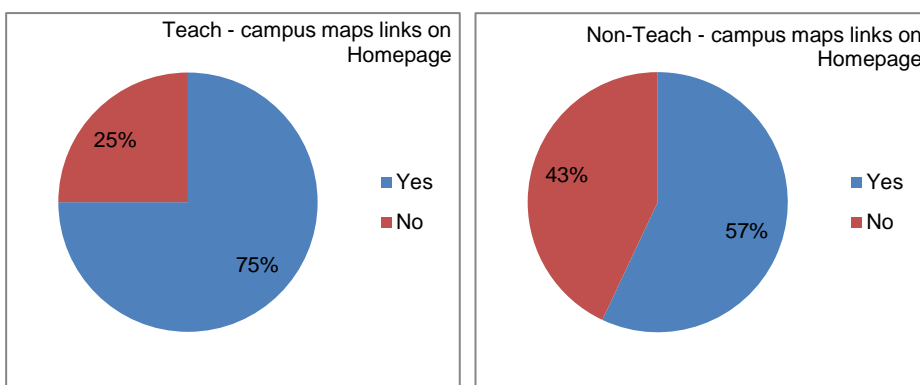


Figure 4. Homepages with links to campus maps

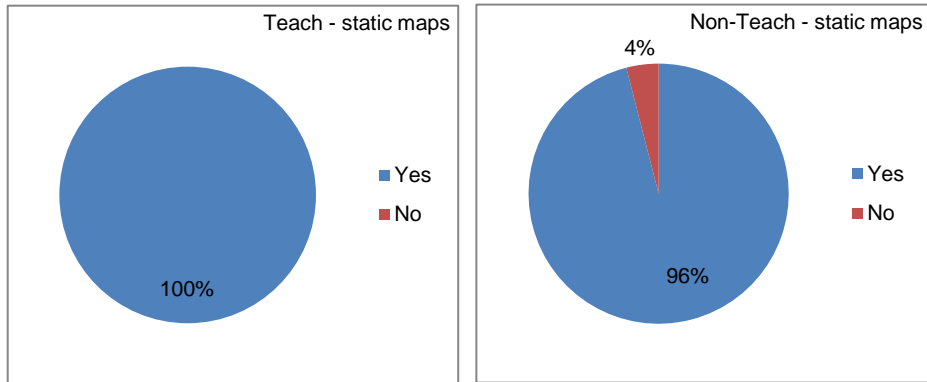


Figure 5. Static maps

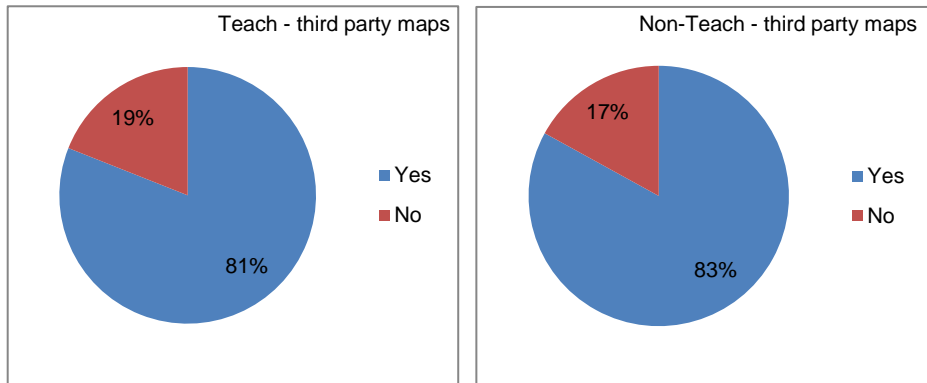


Figure 6. Third party maps

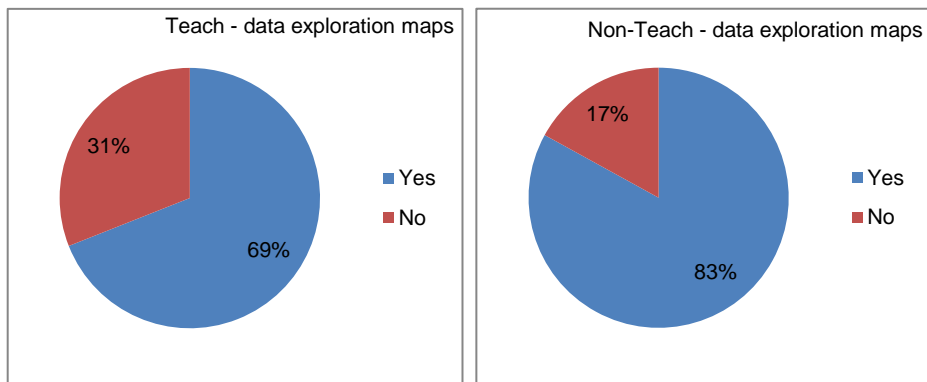


Figure 7. Data exploration maps

4.2. Brand consistency – degree courses

At the 16 mapping/ spatial information teaching universities, 32 undergraduate degrees courses and 38 postgraduate degree courses were evident. There were 32 variations of undergraduate degree course title, although 8 common terms were apparent (*Appendix 1*), from which the keywords ‘Spatial Information Science’ and ‘Surveying’, were the most prominent. 27 variations of post graduate degree course title were found utilising 11 common terms (*Appendix 2*), from which the most prominent were ‘Geoinformation Technology’ and ‘Spatial Science’. Amalgamating the common terms keywords from Appendix 1 and 2, and eliminating duplicates, revealed 12 different terms used for a mapping/ spatial information related degree courses in Australia (*Table 1*).

Geographic Information Science	Geographic Information Technology	Geoinformation Technology	Geospatial Information	Spatial Information	Spatial Sciences
Geographic Information Systems	Geoinformation Systems	Geomatics	Geospatial Science	Spatial Information Science	Surveying

Table 1. Unique common Australian university mapping/ spatial information degree course nomenclature

5. Discussion

5.1. Brand understanding – campus maps

Even though the mapping/ spatial information teaching universities had more links than non-teaching universities to campus maps on their respective homepages, there is still a sizeable proportion (25 %) without this facility on the front page of their website. As such, there is an immediate and relatively inexpensive opportunity for these universities to contribute to the promotion of mapping/ spatial information by ensuring that at least there is a link to mapping on their respective homepages. The analysis did show that all but one of universities had the most basic static campus map and that within these two sets of analyses, the mapping/ spatial information teaching universities were quite rightly superior, which should be expected. However, the trend began to be reversed with reference to third party mapping e.g. Google Maps. Although such mapping was prevalent on many university websites, the non-teaching universities tended to use this functionality a little more. There could be an opportunity for this trend to be reversed if 19% of the mapping/ spatial information

teaching universities incorporated such familiar packages into their campus map facilities. Moving onto the data exploration functionality, there were more non-teaching mapping/ spatial information universities exhibiting these type of campus maps than teaching universities. Some teaching universities reflected a move towards the exemplar campus maps used in other parts of the world, such as Curtin University, University of Queensland and University of Melbourne with their mobile mapping applications, but they were in the minority. It would seem that on the whole Australian universities that teach mapping/ spatial information are not showcasing the industry by not responding to the opportunities that disruptive technologies are offering. Moreover, it would seem to be more reflective of the sustaining technology approach detailed by Christian (2003) and such a lack of response could perpetuate the falling student numbers scenario and, and reflect to the assertion of Huang and Sošić (2010), that such a path could be catastrophic for an industry. As it currently stands, the overriding outcome from this analysis is that it is an opportunity missed. This situation can be rectified, but all the mapping/ spatial information teaching universities need to take the lead. A new breed of interactive maps would showcase the industry possibilities and could even be the platform for a more elaborate marketing tool with the incorporation of adverts, as used at the Boston University (Figure 8).

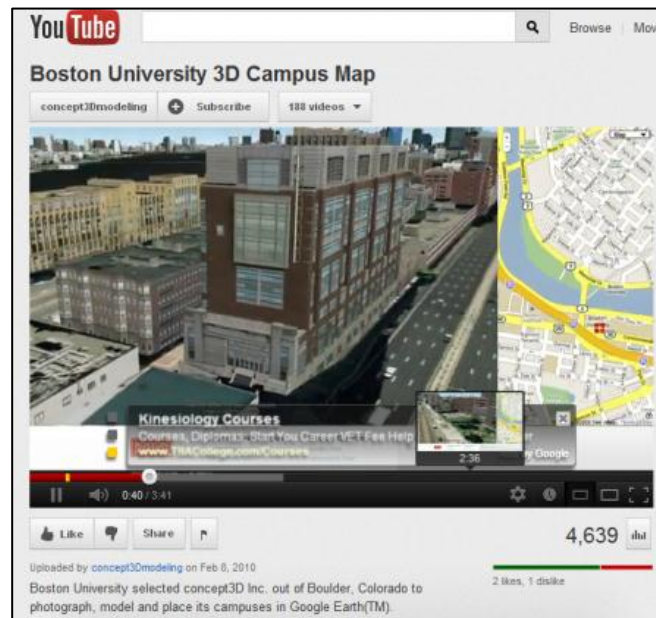


Figure 8. YouTube campus map video with educational course advertisement (Source: YouTube, 2012)

There could be a number of reasons for the relatively poor exposure of mapping/ spatial information functionality; for example financial restrictions or key stakeholder buy in, but these are not insurmountable obstacles. For example, with reference to finance, current mapping/ spatial information students could be tasked with creating interactive campus maps as course assignments or even sponsored by industry to undertake projects deemed worthy, as is the case with the Ordnance Survey in Great Britain that sponsors Masters students (OS, 2012). From a key stakeholder perspective, collaboration within the university property services departments could be fruitful, as exemplified by the University of Otago (New Zealand) Property Services iMap that serves as a campus map and an asset management tool (University of Otago, 2012). Such a partnership could possibly cover the developmental costs and the collaboration could be taken even further into new emerging fields of research such as Building Information Modelling (BIM), a ‘modeling technology and associated set of processes to produce, communicate and analyse building models’ (Eastman et al, 2008).

5.2. Brand consistency – degree courses

With regards to the Australian university degree courses on offer, there would appear to be a brand present through the ‘Surveying’ and ‘Spatial [Information] Science’ nomenclature which would be consistent with the peak national body, the Surveying and Spatial Sciences Institute. Surveying in particular, has had some success as a branding exercise with the Victorian Surveying Task force and Surveying South Australia marketing initiatives. Surveying ties neatly with the Gardner and Levy (1955) assertion that time is an important factor when defining a brand, as surveying has been around for many years. Whilst the brand name of ‘Surveying’ can be confused with other types of Surveying: Building, Ship, Health, Quantity and Marine, internet searches conducted in Australia nearly always place the ‘Surveying’ associated with spatial science at the top of search lists. The same cannot be said for the brand ‘Spatial Information’. This is a relatively new term and its clarity is obscured by the use of a ‘geo’ prefix for both ‘spatial’ and ‘information’, a propensity which is reflected in the proliferation of 12 different terms for a mapping/ spatial information courses. There is an opportunity to redress this and at the same time reinvigorate a classic term, one that would echo Wilson and Gilligan’s (2002) suggestion of creating an understandable image to which potential consumers can relate. The opportunity would be to capitalise on the disruptive technologies and bring back ‘map’ into the degree course nomenclatures of universities. Only one of the Australian universities use this term (a postgraduate diploma) yet, there is a dichotomous situation present on university websites in that campus *maps* are portrayed, but

courses relating to undertaking related degree courses predominantly use terms such as *spatial* etc. The use of the word map as a familiar term to which the Australian public can relate is reinforced by websites such:

- Geoscience Australia (Australia's national mapping agency) public GIS data download site 'MapConnect' (GA, 2012),
- Public Sector Mapping Agency - an unlisted public company that is owned by Federal and State government in Australia (PSMA, 2012) and
- South Australia's Department of Environment, Water and Natural Resources 'NatureMaps' service (DEWNR, 2012).

Conversely, the spatial industry could continue down the sustaining technology path serving its existing customers, but it would seem that this course of action is not bringing students into relevant courses and thus not supplying the demand.

6. Conclusion

A combination of online mapping applications such as Google Earth, related technologies such as in-car satellite navigation systems and the use of location in smart phone applications have brought mapping back into the public mind, albeit surreptitiously. In Australia, mapping/ spatial educators have an opportunity to capitalise on this renewed interest in locality, and use it positively to plug the gap between the demand by modern day business for mapping/ spatial information and the inadequate supply of accredited professionals. To aid the achievement of this goal, establishing an understandable and cohesive brand is crucial. This research has identified that, the status quo is not an option as numbers enrolling are low.

From an understanding perspective, as a mapping/ spatial information advertisement, current Australian university campus maps vary in detail and functionality and although there are a few leading lights with regards to data exploration maps within the mapping/ spatial information teaching universities, it would seem that more non-teaching mapping universities are taking an interest in the possibilities that mapping/ spatial information can bring to university life. This is not a good situation for the spatial industry and mapping/ spatial information related teaching universities need to take the lead to illustrate the industry capabilities. Campus maps should be a showcase for the spatial industry, not only as a display of what can be undertaken, but also as a marketing mechanism for future spatial professionals.

With regards to the branding consistency, a lead could be taken from the surveying adage 'Working from the whole to the part'. The brand needs to be uniform across Australia, needs to reflect the industry requirement for professionals and provide a clear and understandable message to the public. There are a plethora of mapping/ spatial information related courses with far too many variations on a [mapping] theme. The parts [individual universities] should dispense with the individuality of marketing locally and move to a whole [Australian wide] model. Building on the disruptive technology impetus, the reintroduction and reinvigoration of the word map into university degree nomenclature would be advisable. It is a term that is familiar and understandable to the public and would be a hook to entice new entrants. With the current precedent of the re-emergence of surveying within Australia as an industry, where investment has been made in promoting surveying as a brand, universities are not competing for students; rather they have joined forces to raise student numbers which will benefit the industry as a whole. With regards to the mapping/ spatial information brand, currently 'Spatial [Information] Science' seems to be the dominant nomenclature, but do prospective students understand what spatial is, can they be bothered to find out, or will they pursue another career path that is more forthright in displaying what it does e.g. engineering? The time has come for deep thinking about what the industry is and what it should be seen to teach. To encourage more students, the 'hoodie' needs to be taken down fully and expose that it is mapping that lurks beneath. *If* the Australian spatial industry wishes to widen its horizons and engage students, then it has to review, simplify and dispense with the confusing nomenclatures used.

The two avenues suggested in this research are not a panacea to all the issues with regards to declining mapping/ spatial information student numbers in Australia, but they are important factors that would contribute to a reversal. These solutions could be analogous with the fashion industry where 'anoraks are back, the turnaround has come, anoraks can be accessorised' (Zupet, 2008): so too can maps. Students understand maps, students engage with maps, students are not scared of maps. The spatial industry should release any inherent fears that the industry will be dumbed down by using the word map. The science (and art) of mapping is complex, intriguing, and exciting. The Australian spatial industry should dust off the old, dull image of map, embrace the word, build upon the use of disruptive mapping technologies and 'go back to sustain the future'.

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Appendices

Appendix 1: Australian undergraduate courses (March, 2012)

Keywords	Courses									
Geographic Information Science	Geographic Information Science	Geographic Information Science/ Applied Geography								
Geographic Information Systems	Applied Geographic Information Systems									
Geoinformation Systems	BE Geo Information Systems (GIS)									
Geomatics	Environments (geomatics major)	Science (geomatics major)								
Geospatial Science	Applied Science (Geospatial Science) (Honours)	Science (Geospatial Science)								
Spatial Information Science	Arts with the degree of Bachelor of Science with a major in Spatial Information Science	Commerce with the degree of Bachelor of Science with a major in Spatial Information Science	Engineering with the degree of Bachelor of Science with a major in Spatial Information Science	Environment with the degree of Bachelor of Laws with a major in Spatial Information Science	Science with the degree of Bachelor of Laws with a major in Spatial Information Science	Science with the degree of Bachelor of Education with a major in Spatial Information Science			Spatial Science Technology	Urban Development (Spatial Science)
	Actuarial Studies									
Spatial Sciences	Bachelor of Science with a major in Spatial Information Science	Science - Major in spatial sciences								
	Applied Science (Surveying)	Surveying	Mine and Engineering Surveying	Engineering (Civil) Surveying	Surveying (Honours)	Surveying and Spatial Sciences Honours	Surveying/ Entrepreneurship	Surveying/ Property		

Appendix 2: Australian postgraduate courses (March, 2012)

Keywords	Courses			
Geographic Information Science	Geographic Information Science	Science with a major in Geographic Information Science		
Geographic Information Technology	Geographic Information Technology			
Geographic(al) Information Systems	Geographic Information Systems	GIS and Remote Sensing	Geographical Information Systems	
Geoinformation Technology	Engineering Science (Extension) (Geoinformation Technology):	Engineering Science (Geoinformation Technology):	Engineering Science (Geoinformation Technology): MEng Sc	Certificate of Engineering Science (Geoinformation Technology):
Geomatics	Engineering (Geomatics)			
Geospatial Information	Geospatial Information	Applied Science (Geospatial Information)		
Geospatial Science	Science (Geospatial Science)	Applied Science (Geospatial Sciences) by Research		
Spatial Information	Certificate of Science and Technology (Spatial Information)	Science and Technology (Spatial Information)		
Spatial Information Science	Science in Spatial Information Science	Spatial Information Science	Spatial Information Science with Honours (N6Y)	
Spatial Sciences	Spatial Science	Spatial Science Technology (GCST)	Spatial Science Technology (GDST)	Spatial Science Technology (MSST)
Surveying	Land Surveying (K6J)	Surveying	Surveying and Mapping	